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(54) Sole structure

(57) Sole structure able to associated to an upper (2) of a shoe (1), having first ducts (8) in the area (7) of the plantar arch and of the tip and one or more lateral openings (9) in the heel area (30). In the heel area (30) is obtained a seat (11) for a counter-shaped insert (12) provided with at least an elastically compressible central area (14), inferiorly communicating with second ducts (17) communicating in turn with third ducts (19) obtained superiorly to the insert (12) and communicating with the first ducts (8) and with the openings (9a), (9b) and (9c) through the interposition of a gasket (22) permeable to air but not to water. The insert (12) has an upper surface (13) whereon is obtained a central area (14), elastically compressible and inferiorly communicating with a cavity (15), obtained on a lower surface (16) of the insert (12), in such a way that to a deformation of the central area (14) corresponds a variation of the volume of the cavity (15).

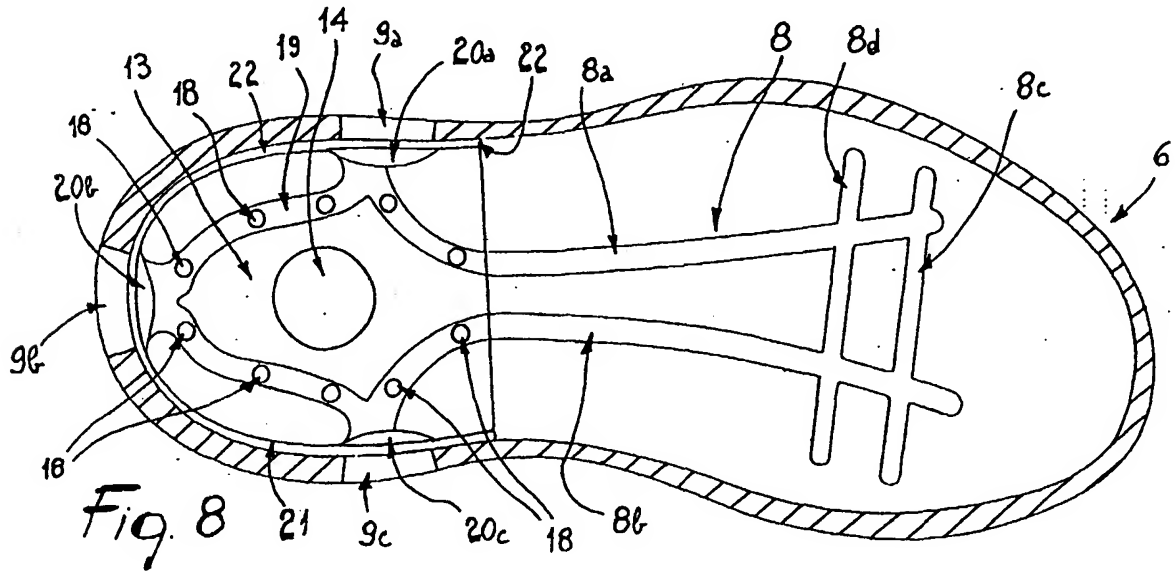

Fig. 8

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Description

[0001] The present invention relates to a sole structure able to be associated to an upper of a shoe.

[0002] Nowadays, several known shoes present on the market have multiple systems and methods for aerating the interior part of the shoe.

[0003] Some known shoes partially achieved the assigned task by means of appropriate holes, for instance obtained on the upper.

[0004] Such solutions have the considerable disadvantage of allowing water infiltration inside the shoe.

[0005] The use, in correspondence with such holes, of possible layers of materials which are transpiring and impermeable at the same time does not completely solve the problem of achieving a good aeration of the shoe, since the exchange of air between the interior of the shoe and the environment is very limited.

[0006] In other known shoes, appropriate ducts are employed, for instance obtained on the upper surface of the sole, and advantageously communicating with the exterior, so that the air can be circulated in said ducts and reach the foot passing through an appropriate transpiring arch support, in contact with said sole.

[0007] The main disadvantage of this solution also consists in the possible infiltration of water in the interior of the shoe, which takes place through the ducts.

[0008] A further known shoe is constituted by an upper comprising a transpiring arch support, positioned superiorly to an impermeable sole.

[0009] Between said sole and the arch support is positioned an aerating device constituted by an air elastically deformable tank, through a first one-way valve, with an air diffuser element positioned in proximity to the metatarsus area and appropriately holed, in order to distribute air within the upper.

[0010] The tank is also connected to a second check valve positioned, for instance, laterally to the sole, able to draw air from the exterior.

[0011] The second check valve has a sufficiently small internal diameter to prevent water from entering, thereby guaranteeing impermeability.

[0012] This device functions while the user walks, since at each step, when the heel bears down on the ground, the tank is compressed, thereby sending air to the diffuser element.

[0013] After the foot is raised, the elastically deformable tank returns to its shape, thereby creating a vacuum that draws air from the exterior, through the second check valve.

[0014] The main drawback of this known shoe consists of the fact that it presents considerable construction complexity, having multiple delicate mechanisms in an ar a, the sole, that usually undergoes numerous strong stresses, with the risk that th aerating device may be subject to malfunctions or breakag .

[0015] Another disadvantage of this sho stems from the high global cost, essentially du to the constructiv complexity of the aeration device, to the work processes to be executed and to the need to assemble the various components of the sole at the end.

[0016] The main aim of the present invention therefore is to solve the technical problems highlighted above, eliminating the drawbacks of the aforementioned prior art and thus devising an invention which allows to obtain a shoe that allows a good aspiration through the sole, whilst insuring a safe and effective impermeability.

[0017] Within the scope of the task set out above, another important aim is to obtain an invention that allows to achieve the specified aim by means of a simple and rugged aeration mechanism, thereby avoiding possible breakage or malfunctions.

[0018] Yet another important aim is to obtain an invention that achieves the specified aim without sacrificing the resistance and aesthetic quality of the shoe.

[0019] Not the least aim is to obtain an invention that is structurally simple, whilst also having low costs of production.

[0020] The aforementioned task and aims, as well as others that will become more readily apparent farther on, are achieved by a sole structure as described in the claims that follow.

[0021] Further features and advantages of the invention shall become more readily apparent from the detailed description that follows of a particular embodiment, illustrated purely by way ofnon limiting indication in the accompanying drawing tables, in which:

- Figure 1 shows, in an exploded view with some selected parts, a shoe comprising an upper, an arch support and a sole made in accordance with the present invention;
- Figure 2 shows a top perspective view of a gasket;
- Figure 3 shows a top perspective view of an insert;
- Figure 4 shows a top perspective view of the upper surface of the insert of Figure 3;
- Figure 5 shows a three-quarters view of the lower surface of the insert of Figure 3;
- Figure 6 shows an exploded view of the layers constituting the gasket of Figure 2;
- Figure 7 shows a lateral section view of the sole in which are positioned the insert, the gasket and the arch support;
- Figure 8 shows a plan view of the sole of Figure 7.

[0022] With reference to the aforementioned figures, the reference number 1 indicates a shoe constituted by an upper 2 whereto is inferiorly associated a sole 6.

[0023] Advantageously, the sole 6 comprises superiorly an arch support 4, presenting a first and a second area, indicated with the numbers 5a and 5b, made of a transpiring material.

[0024] Th sol 6 further comprises an insert 12, as in Figur s 4 and 5, and has, in the area 7 of the arch support and of th tip, first ducts 8, suitabl for the circulation of air flows.

[0025] The first ducts 8 can be positioned and shaped in multiple ways; Figure 8 shows a solution providing a first pair of first ducts 8a and 8b, positioned longitudinally and slightly diverging towards the tip of the sole and transversely joined by a second pair of first ducts 8c and 8d having also the function of facilitating the deformation of the sole 6 when th user is walking, thereby easing his/her ambulation.

[0026] Also obtained in the sole 6 are one or more openings 9, in this embodiment a first, a second and a third opening, indicated respectively with the numbers 9a, 9b and 9c, obtained for instance on the first lateral surface 10 of the sole 6, in posterior and lateral position, advantageously in correspondence with the heel.

[0027] These first, second and third opening 9a, 9b and 9c can have circular, oval, elliptical or lanceolate shape, and are able to place the interior of the shoe in communication with the exterior.

[0028] In the sole 6, preferably in correspondence with the area 30 of the heel, is also obtained a seat, indicated with the number 11, having box-like shape and open superiorly, for housing the insert 12, which is shaped counter to the seat 11 itself.

[0029] In correspondence with an upper surface 13 of the insert 12, and inferiorly to the first area 5a, a central area is advantageously obtained, indicated with the number 14, elastically compressible and opportunely shaped as a spherical dome, in such a way as to project superiorly to said upper surface 13 itself.

[0030] The central area 14 is inferiorly communicating with a cavity, indicated with the number 15, obtained on the lower surface 16 of the insert 12, in such a way that to a deformation of the central area 14 corresponds a variation of the volume of the cavity 15.

[0031] On the lower surface 16 of the insert 12 are obtained second ducts 17, which depart from said cavity 15, advantageously in the radial direction.

[0032] Each second duct 17 joins the cavity 15 to the respective hole 18, external to the cavity; said holes 18 pass vertically through the insert 12 in order to place in communication the second ducts 16 with respective appropriate third ducts 19.

[0033] The third ducts 19, also suitable for air circulation inside the sole 6, are obtained on the upper surface 13 in proximity to the central area 14 and are in communication both with the first ducts 8 and with a plurality of recesses 20 in this particular embodiment with a first, a second and a third recess, indicated with the numbers 20a, 20b and 20c.

[0034] The first, second and third recesses 20a, 20b and 20c are advantageously obtained on a second lateral surface, indicated with the number 21, of said insert 12.

[0035] The first, second and third recess 20a, 20b and 20c are shaped, in a plan view, as an arc of a circle, and are positioned respectively in correspondence with the first, second and third opening 9a, 9b and 9c.

[0036] Betw en the first lateral surface 10, located internally to said sole 6, and the second lateral surface 21 of the insert 12 is preferably positioned a gasket, indicated with the number 22, having approximately rectangular development and horse-shoe shape. The gasket is impermeable to water but not to air.

[0037] As shown in Figure 6, said gasket 22 is advantageously constituted by a first, a second and a third layer, indicated with the numbers 23a, 23b and 23c, heat sealed together, for instance with high frequency electromagnetic waves.

[0038] The second layer 23b is conveniently constituted by thermoplastic material and has one or more openings 24, in this embodiment a fourth, a fifth and a sixth opening, indicated with the numbers 24a, 24b and 24c, in correspondence with said first, second and third opening 9a, 9b and 9c.

[0039] The first internal layer 23a is advantageously constituted by impermeable and transpiring fabric, such as material known with the trademark GORE-TEX; the third layer 23c, appropriately holed for air passage, can be constituted, for instance, by a mesh of plastic material such as polyvinylchloride, and serves a function of support and protection against possible impacts or rubbings against external elements.

[0040] The operation of the sole 6 of the present invention therefore is as follows: with reference to Figure 7, upon laying the heel down, the user's weight causes the compression and hence the deformation of the central area 14, which consequently reduces the volume of the cavity 15.

[0041] The air contained in this cavity is thus forced to travel through the second ducts 17 and the through holes 18, in such a way as to reach the third ducts 19.

[0042] Thence, the air can circulate through the first ducts 8 or exit through the first, second and third openings 9a, 9b and 9c, passing through the first layer 23a made of GORE-TEX and the third layer 23c.

[0043] On the contrary, when the heel is raised off the ground and the weight is taken off the sole, the central area 14 returns to its non deformed configuration, causing an increase in the volume of the cavity 15.

[0044] The increase in the volume of the cavity 15 consequently causes a flow of air in the second and third ducts 17, 19 in opposite direction relative to the previous flow.

[0045] This flow of air can also come through the first ducts 8, thus aspirating the air from the interior of the shoe and through the first, the second and the third opening 9a, 9b and 9c, thus carrying external air inside the shoe.

[0046] It has thus been noted that the invention has reached its specified task and aims, a shoe having been devised that is provided with a sole that allows the exchange of air between the interior and the xterior of the shoe, thus obtaining an effective transpiration whilst maintaining th requir d characteristics of imperm ability and ruggedness.

[0047] Naturally, th materials mployed as w ll as

the dimensions constituting the individual components of the invention may be more pertinent according to specific requirements.

Claims

1. Sole structure able to be associated to an upper (2) of a shoe (1), presenting first ducts (8) in the area (7) of the plantar arch and of the tip and one or more lateral openings (9) in the heel area (30), characterised in that in said area of the heel (30) is obtained a seat (11) for a counter-shaped insert (12) provided with at least a central area (14) elastically compressible and inferiorly communicating with second ducts (17) in turn communicating with third ducts (19) obtained superiorly to said insert (12) and communicating with said first ducts (8) and with said openings (9a), (9b) and (9c) through the interposition of a gasket (22) permeable to air but not to water.

2. Structure as claimed in claim 1 characterised in that it comprises an arch support (4) presenting one or more areas (5a), (5b) made of transpiring material, and in that said first ducts (8) are constituted by a first pair (8a), (8b) of ducts positioned longitudinally and slightly diverging towards the tip of said sole and transversely joined by a second pair (8c), (8d) of first ducts.

3. Structure as claimed in claim 1 or 2 characterised in that said one or more openings (9) comprise a first, a second and a third opening (9a), (9b), (9c) obtained on a first lateral surface (10) of said sole (6), in correspondence with the heel area (30).

4. Structure as claimed in claim 3 characterised in that said first, second and third openings (9a), (9b), (9c) are obtained on said first lateral surface (10), and have circular, or oval, or elliptical or lanceolate shape, to allow communication of the interior of the shoe (1) with the exterior.

5. Structure as claimed in any other of the previous claims, characterised in that said seat (11) has box-like shape, open superiorly, for housing said counter-shaped insert (12).

6. Structure as claimed in any other of the previous claims, characterised in that said insert (12) has an upper surface (13) whereon is obtained said elastically compressible central area (14), shaped as a spherical dome and projecting superiorly from said upper surface (13) itself.

7. Structure as claimed in claim 6, characterised in that said central ar a (14) is inferiorly in communication with a cavity (15), obtained on a lower surface (16) of said insert (12), in such a way that to a deformation of said central area (14) corresponds a variation of the volume of said cavity (15).

8. Structure as claimed in claim 7, characterised in that said second ducts (17) depart from said cavity (15) and develop on said lower surface (16) of said insert (12), said second ducts (17) exiting radially from said cavity (15).

9. Structure as claimed in claim 8, characterised in that at the ends of each of said ducts (17) external to said cavity (15) is obtained a hole (18) passing vertically through said insert (12) in order to place in communication said second ducts (17) with said third ducts (15).

10. A structure as claimed in any of the claims from 6 to 9, characterised in that said third ducts (19) are obtained on said upper surface (13) of said insert, in proximity to said central area (14), and are in communication both with an end of said first ducts (8) and with one or more recesses (20) obtained on a second lateral surface (21) of said insert (12).

11. Structure as claimed in claims 3 and 10 characterised in that said insert (12) presents a first, a second and a third recess (20a), (20b), (20c) shaped, in a plan view, as an arc of a circle, each being positioned respectively in correspondence with said first, second and third opening (9a), (9b), (9c).

12. Structure as claimed in claims 3 and 10, or 11 characterised in that said gasket (22) positioned between said first lateral surface (10), positioned internally to said sole (6), and said second lateral surface (21) of said insert (12), said gasket (22) presenting an approximately rectangular development, in plan view, and a horse-shoe shape.

13. Structure as claimed in any other of the previous claims characterised in that said gasket (22) is constituted by a first, a second and a third layer (23a), (23b), (23c) heat sealed to each other, said second layer (23b) being constituted by thermoplastic material and presenting one or more openings (24).

14. Structure as claimed in claims 3 and 13 characterised in that said second layer (23b) presents a fourth, a fifth and a sixth opening (24a), (24b), (24c) in correspondence with said first, second and third opening (9a), (9b), (9c) obtained on said sole (6).

15. Structure as claim d in claim 13 or 14 characterised in that said first, second and third layer (23a), (23b), (23c) are heat sealed to each other by means of high frequ ncy electromagnetic waves.

16. Structure as claimed in any of the claims from 13 to 15 characterised in that said first internal layer (23a) is constituted by both impermeable and transpiring fabric.

17. Structure as claimed in any of the claims from 13 to 16, characterised in that said third layer (23c) is holed for the passage of air, and is made of a mesh of plastic material.

18. Structure as claimed in claim 17, characterised in that said mesh of plastic material is made of polyvinylchloride.

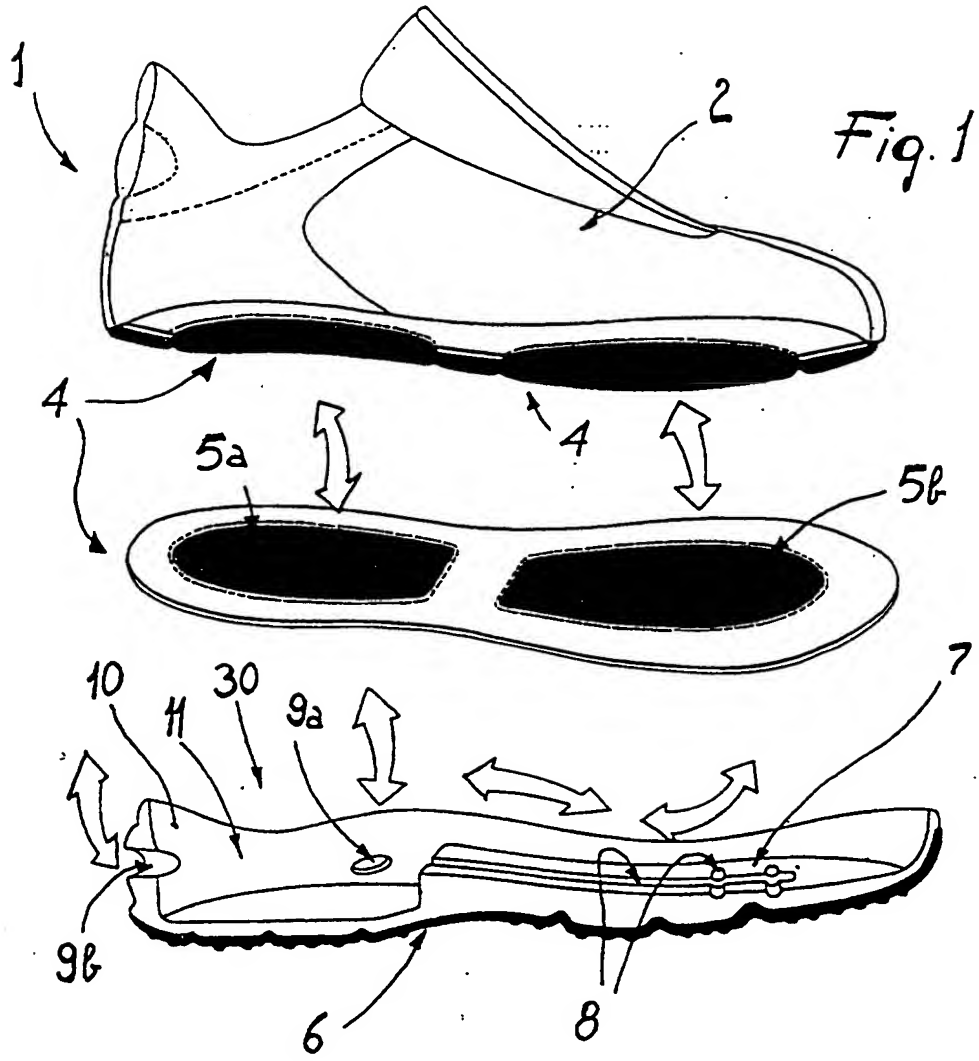

Fig. 1

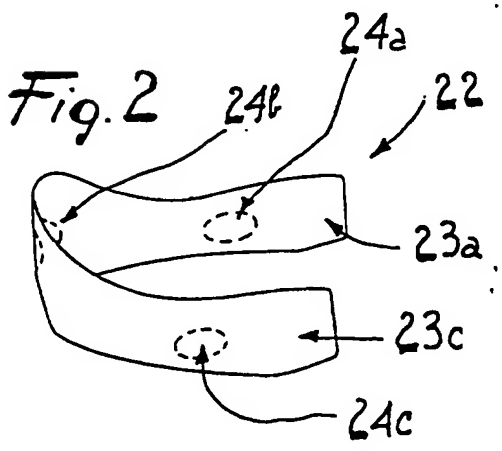

Fig. 2

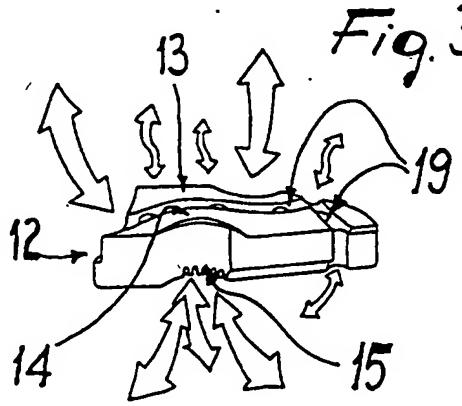

Fig. 3

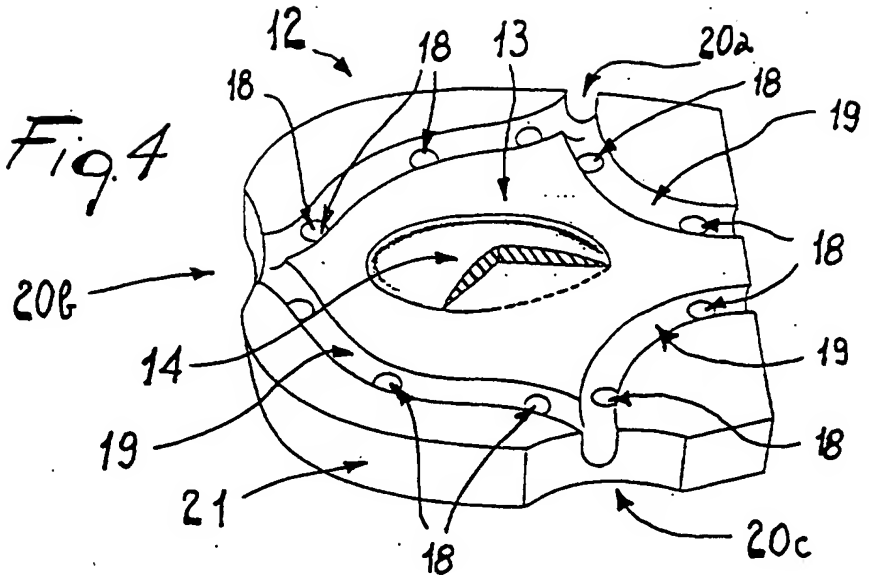

Fig. 4

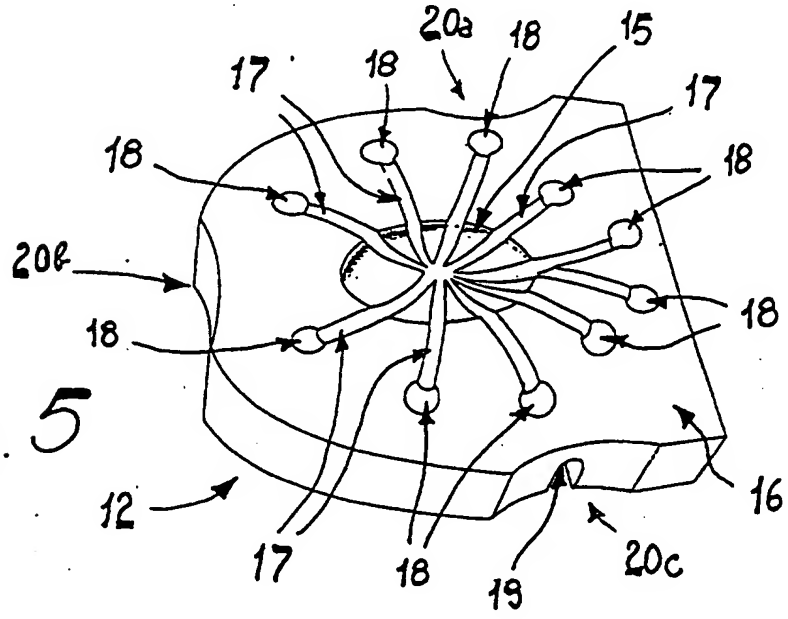

Fig. 5

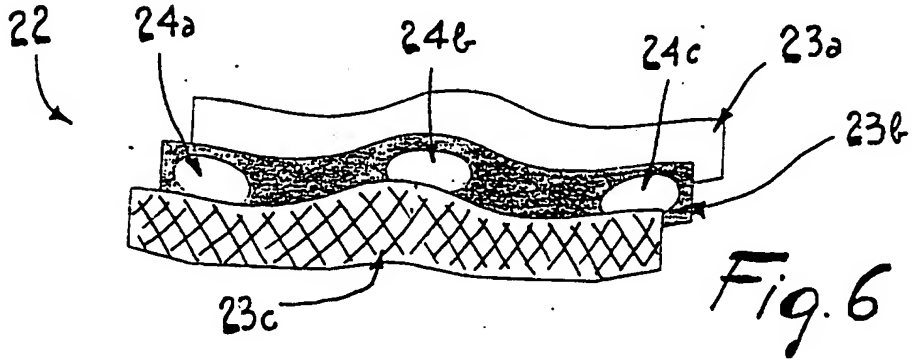

Fig. 6

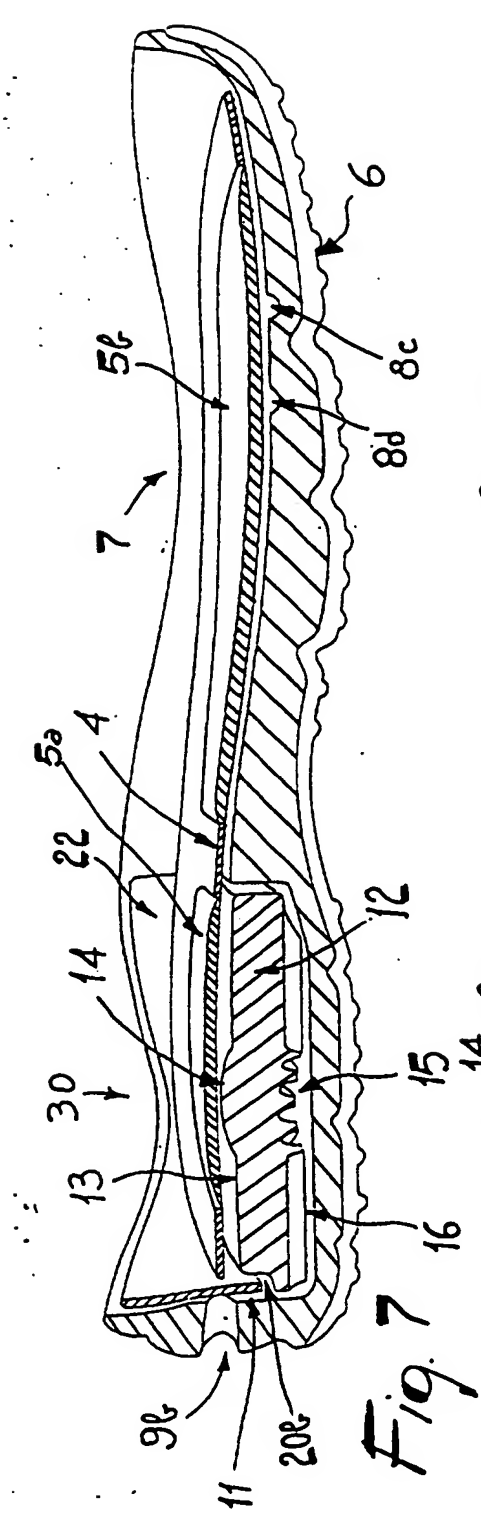
6
5b
8c
8d
7
5a
4
22
12
14
15
30
13
16
9b
11
20b

Fig. 7

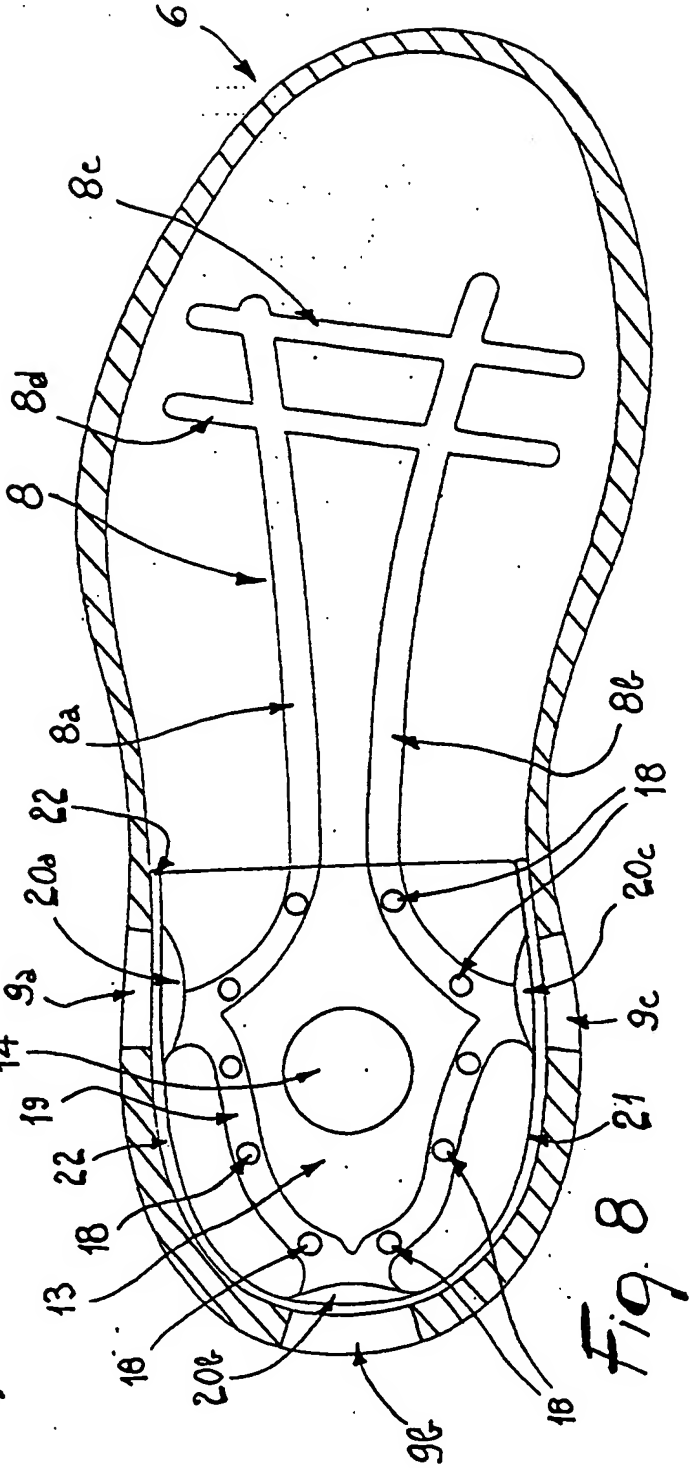
6
8c
8d
8
8a
8b
22
18
20a
20c
9a
9c
14
19
21
22
18
13
18
20b
9b
18

Fig. 8